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02-9004-38-SI
REV. NO. 0

FINAL DRAFT
SITE INSPECTION REPORT
ELIZABETH COAL GAS SITE #2
ELIZABETH, NEW JERSEY
VOLUME 1 OF 2

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-9004-38
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 17, 1990

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:

DAVID J. GRUPP
PROJECT MANAGER

REVIEWED/APPROVED BY:

RICHARD M. SETTINO
SITE MANAGER

RONALD M. NAMAN
FIT OFFICE MANAGER

PART II: WASTE SOURCE INFORMATION

The site was used for the production of coal gas from 1855 to approximately 1901. The uses of the site from 1901 until its present uses by a salvage company and for flood control are unknown. Wastes produced on site were the result of the gasification processes. These wastes typically include ammonia, amonium sulfate, sulfur, coke, coal tar, coal tar pitch, clinker, and light oils. The coal tar may contain significant concentrations of pyrene, anthracene, and other polynuclear aromatic hydrocarbons (PAHs), including known or suspected carcinogens (Ref. No. 1, p.4 and Attachment B). Actual waste handling practices that occurred at the plant are largely unknown. Wastes were reported to be disposed of in unlined pits primarily on the northern portion of the site and most likely extended into the southern portion also. Low grade tar and tar-water mixtures along with spent oil were most likely dumped on site. During an NUS Corp. Region 2 FIT site inspection a substance assumed to be coal was discovered in on- site soils, and a substance assumed to be solidified coal tar was encountered while collecting a subsurface soil sample (Ref. No. 2). It is reported that some remedial action was taken by the Elizabethtown Gas Light Company; however, the time and extent of remediation are unknown (Ref. No. 26).

The structures that existed on site in 1903 are as follows: two gas storage tanks of unknown size, two sheds, a blacksmith shop, a purifying house, a retort building, two coal sheds, an engine house, and an office building (Ref. No. 1, p. 9). Aerial photographs show that most of the structures were removed from the site between 1959 and 1966 (Ref. No. 10). The retort house and office building still exist on site (Ref. No. 1). Figures 1 and 2 provide a Site Location Map and a present day Site Map, respectively. Figure 3 shows a Site Map of the former facility as it existed in 1903. There is no known containment associated with the waste pits. Potential for direct contact is high since there is a public-access baseball field located on the southern portion of the site (Ref. No. 2). The exact quantity of wastes deposited, as well as the size or exact location of any pits that currently exist or formerly existed on site, is unknown.

PART III: PRE-EXISTENT ANALYTICAL DATA

From January 27 to February 5, 1987, eight soil borings were drilled and nine test pits were excavated on site by TAMS Consultants, Inc. (TAMS). Soil samples were collected from the borings and pits at this time for chemical analysis. All samples were analyzed for U.S. EPA Priority Pollutants plus 40 peaks (or selected fractions) and provided with NJDEP Tier II' deliverables by Weston Analytics of Lionville, Pennsylvania Analytical parameters included heavy metals, cyanide, phenolics, polynuclear aromatic hydrocarbons (PAHs), and volatile organic compounds. The area investigated was only in the northern portion of the site immediately under the viaduct. This area was to be used by the New

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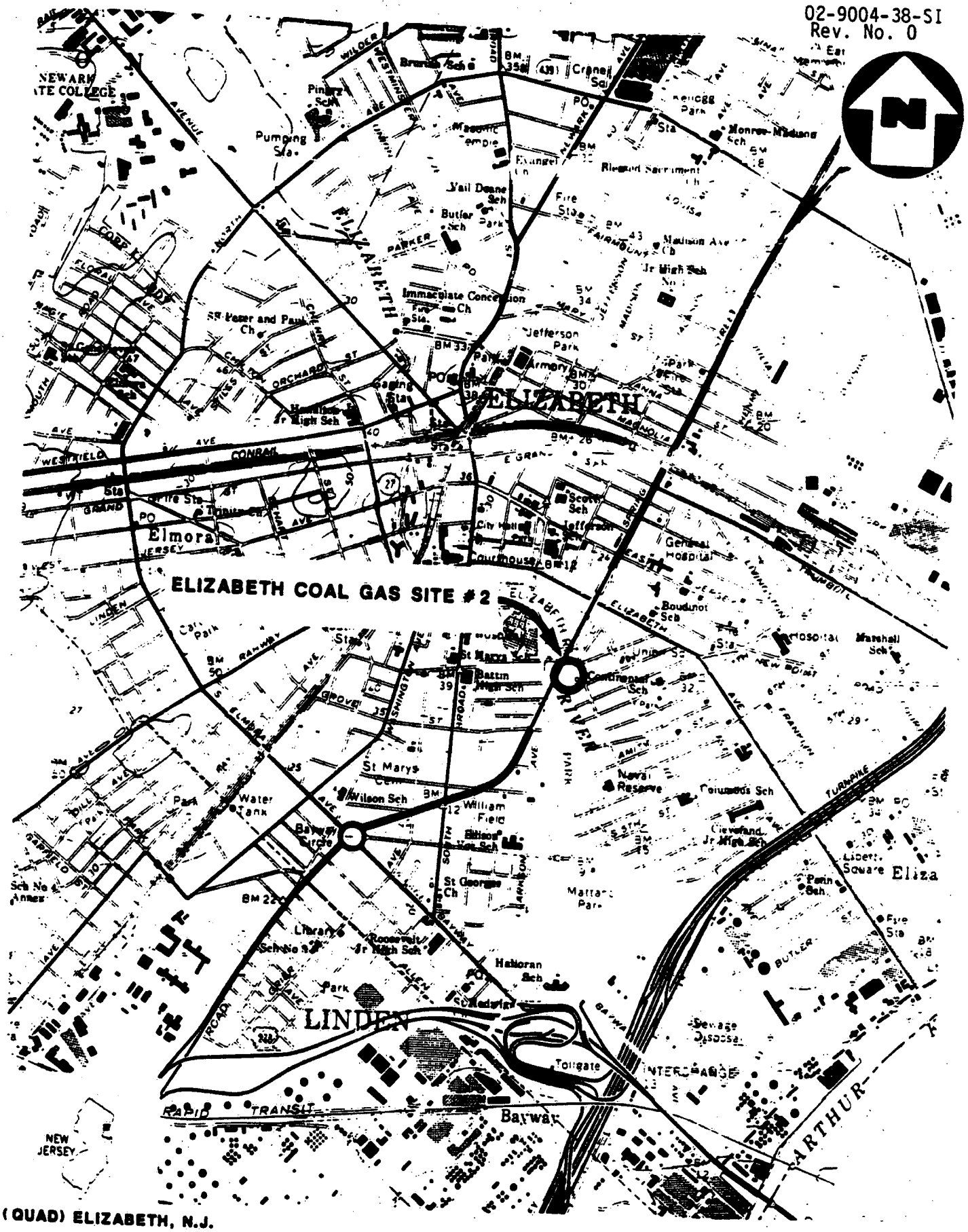

SITE LOCATION MAP

ELIZABETH COAL GAS SITE #2, ELIZABETH, N.J.

SCALE: 1" = 2000'

FIGURE 1

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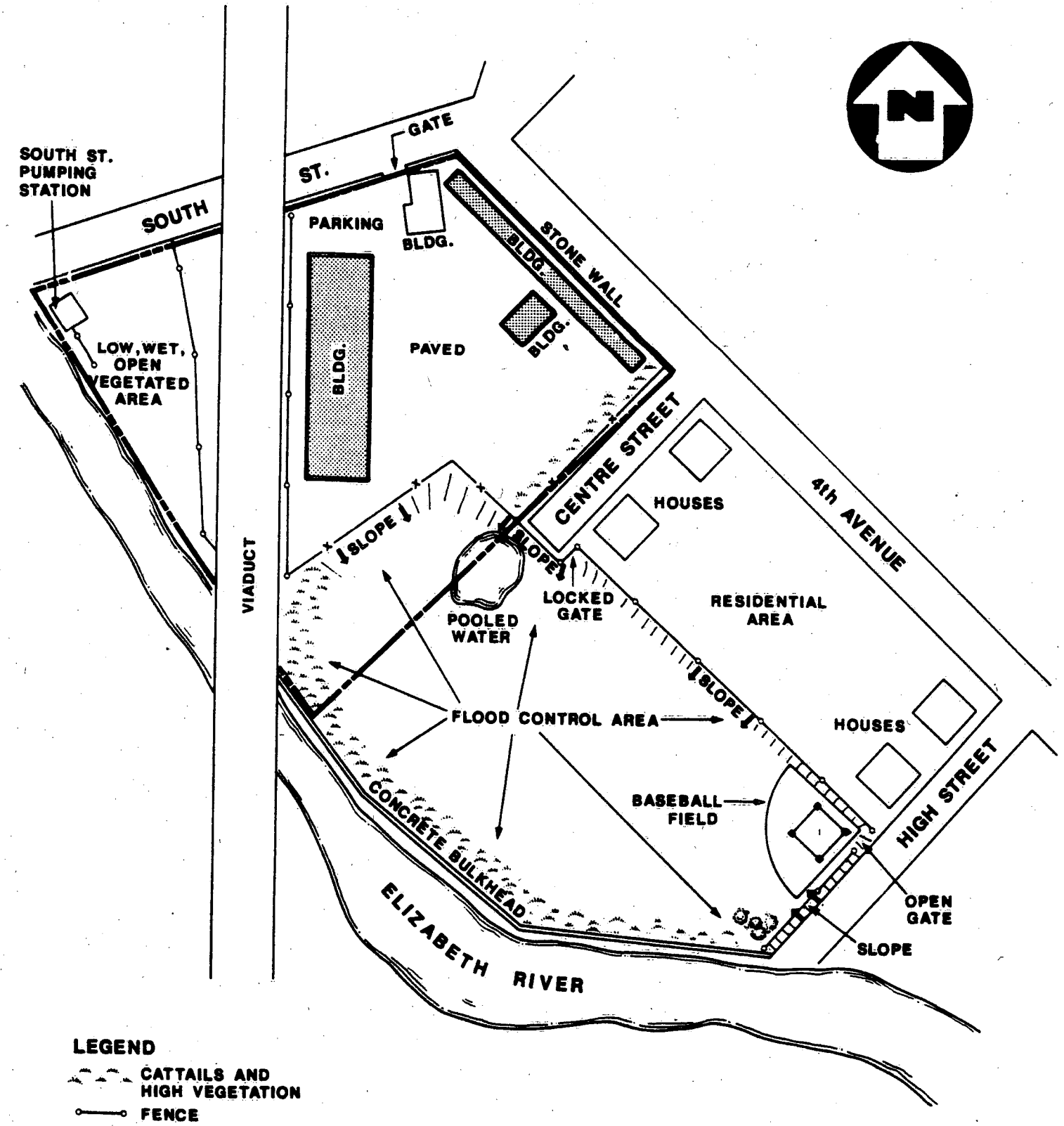

SITE MAP

ELIZABETH COAL GAS SITE #2, ELIZABETH, N.J.

NOT TO SCALE

FIGURE 2

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Jersey Department of Transportation (NJDOT) to widen the viaduct. The TAMS investigation did not include screening of the entire site. Refer to Reference No. 3, Figure 2 for the locations of the borings and test pits.

TAMS reported little visual evidence of coal gasification wastes to be present in these borings and test pits, with the exception of some subsurface retort slag. However, every soil sample tested exceeded the New Jersey Department of Environmental Protection informal action levels for at least one parameter. The inorganics exceeding action levels included cadmium, lead, and cyanide. Inorganic analyses are presented in Reference No. 3, Table 1. The most significant concentrations of organic contaminants detected were for PAHs, ranging from over 40 parts per million (ppm) to 3,090 ppm in eight of the twelve samples taken. High concentrations of other semivolatile organic (dibenzofuran and naphthalenes) and inorganic (lead) compounds were detected in association with the high PAH concentrations. Reference No. 3, Table 2 presents organic analysis results (Ref. No. 3).

PART IV: SITE INSPECTION SAMPLE RESULTS

The NUS Corporation Region 2 FIT (FIT) conducted a sampling site inspection at the Elizabeth Coal Gas Site #2 on June 12, 1990, during which seven surface and seven subsurface soil samples were collected (Ref. No. 2). The soil samples were collected to determine if any soil contamination or waste exists that can be attributed to previous coal gasification operations and to assess the potential for direct contact with contaminants present. The samples were analyzed under the Contract Laboratory Program(CLP) for Target Compound List (TCL) organic and inorganic constituents, including cyanide. All NUS Corporation Region 2 FIT analytical data sheets are provided in Ref. No. 27 of this report. Refer to Figure 4 for all sample locations and to Table 1 for a summary of the organic compounds detected in the soil samples. In the following discussion, all soil sample numbers are preceded by NJGA.

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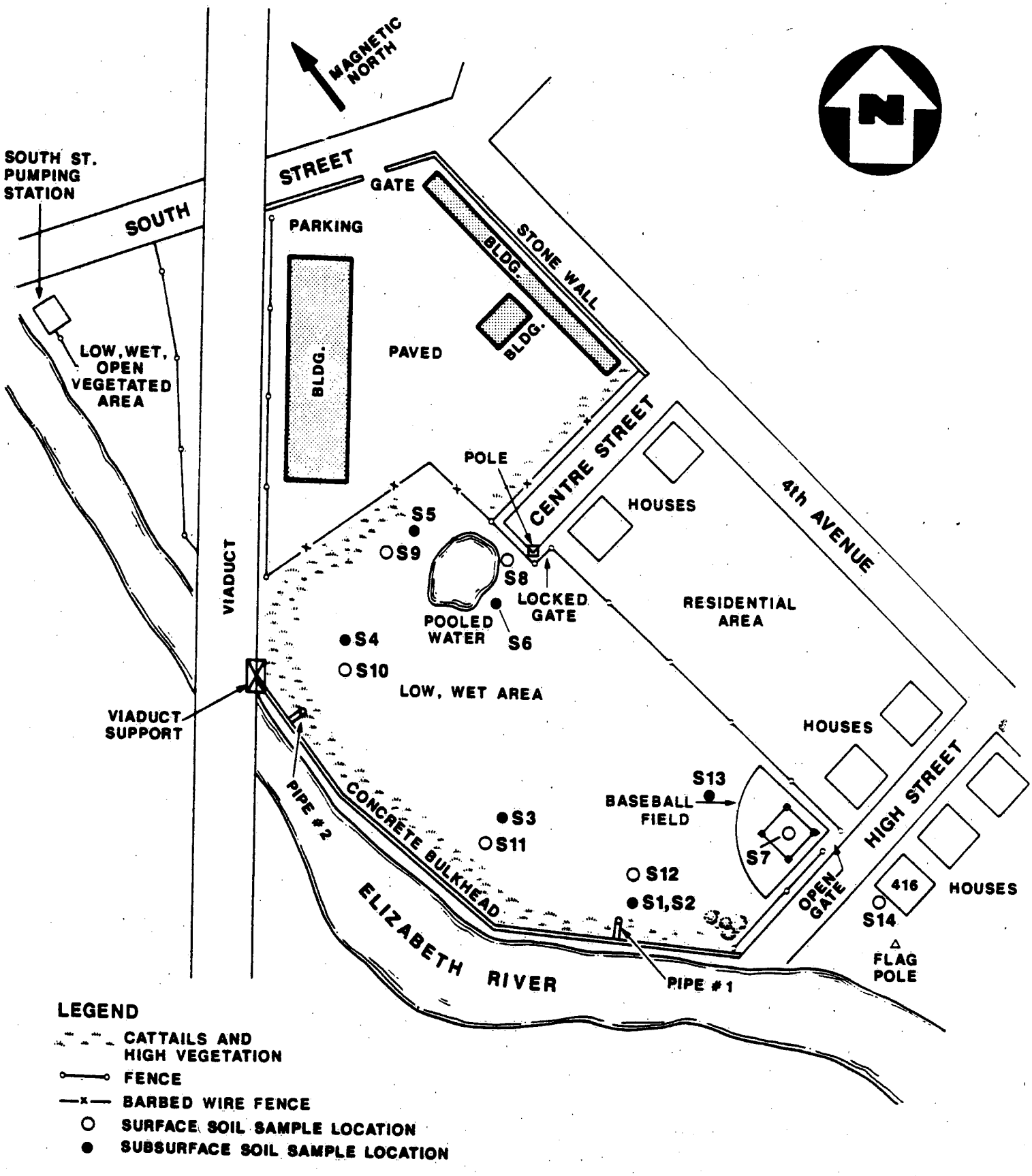
The site can be divided into two sections: the northern portion of the site occupied by Vignola Salvage Corp. and the southern portion owned by Union County. The northern portion of the site was previously sampled by TAMS Consultants, Inc and the data are summarized above. The FIT collected 13 surface and subsurface soil samples (S1 to S13), including a duplicate, from the southern portion of the site, and one surface soil sample (S14) from a residential property, located on the south side of High Street, to serve as a background sample. Sample locations were determined by using a thin-walled tube sampler at random subsurface locations around the site and marking the areas where waste was encountered and/or where readings significantly above background were registered on the HNU or OVA air monitoring instruments. No visual waste was encountered while using the tube sampler to determine the actual sample locations; however elevated readings



SAMPLE LOCATION MAP

ELIZABETH COAL GAS SITE #2, ELIZABETH, N.J.

NOT TO SCALE

FIGURE 4

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TABLE 1: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES COLLECTED AT THE ELIZABETH COAL GAS SITE #2 BY THE NUS CORP. REGION 2 FIT ON JUNE 12, 1990

COMPOUND	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14
VOLATILES														
Carbon Disulfide	J	J	ND	ND	10,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	J	82,000E	ND	7	J	J	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	59,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	14,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	25	68,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILES														
Naphthalene	J	J	J	2,200	270,000E	ND	J	950	1,300	J	J	J	ND	J
2-Methylnaphthalene	J	J	J	J	3,300,000E	ND	ND	J	J	J	J	J	ND	J
Acenaphthylene	J	J	J	3,600	2,600,000E	ND	J	2,300	3,700	2,100	990	J	ND	J
Acenaphthene	J	850	J	1,100	460,000E	ND	J	J	J	J	J	J	ND	J
Dibenzofuran	J	J	J	ND	2,300,000E	ND	ND	J	860	J	J	J	ND	J
Phenanthrene	2,900	5,300	3,600	44,000	220,000E	ND	740	11,000	20,000	7,900	5,200	3,700E	ND	10,000
Anthracene	1,300	2,800	1,300	7,600	2,900,000E	ND	J	3,800	5,200	1,700	1,300	1,200E	ND	J
Flouranthene	7,700	11,000	8,400	140,000	140,000E	ND	2,300	27,000	34,000	12,000	12,000E	7,900E	J	9,600
Pyrene	7,800	10,000	8,600	140,000	140,000E	ND	2,900	26,000	32,000	9,200	8,400	5,700E	ND	8,800
Fluorene	J	J	J	2,200	2,500,000E	ND	ND	1,400	1,700	J	J	J	ND	J

Notes:

All results reported in ug/kg
E = Estimated Value
ND = Not Detected
J = Estimated value, compound present below CRQL but above IDL

Ref. No. 27

TABLE 1: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES COLLECTED AT THE ELIZABETH COAL GAS SITE #2 BY THE NUS CORP. REGION 2 FIT ON JUNE 12, 1990 (CONT'D)

COMPOUND	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14
SEMIVOLATILES (CONT'D)														
Benzo(a)anthracene	5,900	7,200	5,600	74,000	2,500,000E	ND	1,600	14,000	16,000	12,000	7,100	3,600E	ND	3,600
Chrysene	5,400	7,800	5,800	140,000	2,800,000E	ND	1,500	22,000	27,000	12,000	9,200	4,400E	ND	5,400
Benzo(b)fluoranthene	4,900	5,300	4,600	82,000	1,500,000E	ND	1,700	14,000	16,000	16,000E	8,400	5,100E	ND	5,000
Benzo(k)fluoranthene	2,900	3,800	3,200	ND	1,400,000E	ND	ND	7,600	ND	ND	3,800	2,500E	ND	ND
Benzo(a)pyrene	3,700	3,700	3,100	94,000	1,900,000E	ND	1,200	9,600	4,100	9,000	6,100	3,600E	ND	3,300
Indeno(1,2,3-cd)pyrene	3,200	3,200	2,800	73,000	1,000,000E	ND	1,000	8,700	8,900	8,200	5,200	2,700E	ND	2,500
Dibez(a,h)anthracene	1,900	1,700	1,700	11,000	570,000E	ND	J	6,000	5,100	3,500	2,200	1,100E	ND	940
Benzo(g,h,i)perylene	2,800	2,800	2,500	57,000	870,000E	ND	830	8,400	8,000	8,400	3,900	2,100E	ND	3,000
PESTICIDES														
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	230	220E	J	J	ND	ND	J

Notes:

All results reported in ug/kg.
E = Estimated Value
ND = Not Detected
J = Estimated value, compound present below CRQL but above IDL

Ref No 27

PART VII: SITE SUMMARY AND RECOMMENDATIONS

The Elizabeth Coal Gas Site #2 is an inactive former coal gasification site located in a mixed urban residential and industrial area between South Street, High Street, Fourth Avenue, and the Elizabeth River under the U. S. Routes 1 and 9 Viaduct in Elizabeth, New Jersey. The site is comprised of approximately 2 acres and can be divided into two sections. The northern section of the site is an active salvage area while the southern portion is inactive and is used for flood control and as a public-access baseball field

The site has been owned by Elizabethtown Gas Light Company since 1855 and was used to manufacture coal gas until approximately 1901. Coal gas operations took place primarily in the northern portion of the site but most likely extended into the southern portion also. Presently, the northern section of the property is still owned by Elizabethtown Gas Light Company but is operated by Vignola Salvage Corp. as a storage and light industrial facility. The sourthern half of the property was donated to the Union County Department of Parks and Recreation by the City of Elizabeth in 1953. This part of the property is part of a flood control project. A small rectangular parcel of property, which encompasses the baseball diamond itself, is owned by the Church of Saint Anthony (Ref. No. 28).

Actual waste handling practices used at the plant during the time of coal gas production are largely unknown. It is very likely that coal and coke were stored on site in large piles. Waste materials which were not marketable, such as poor quality tars and oils, were probably deposited in unlined pits on site. Analytical results of surface and subsurface soil samples taken during the NUS Region 2 FIT site inspection indicate the presence of elevated concentrations of compounds associated with coal gas manufacturing wastes. A substance assumed to be solidified coal tar was encountered at sample location S5, and elevated levels of various organic compounds including high levels of polynuclear aromatic hydrocarbons (PAHs) were detected in a sample of the material. Although levels of PAHs were generally higher than those found in the sample that was intended to represent the background conditions, in many instances "background" levels for other compounds detected were comparable to or higher than those found in some on-site soil samples. This indicates that either those on-site samples are unaffected by facility wastes or that the residential area where the "background" sample was collected has been impacted by the site. Some remedial action has been reported to have occurred at the site along with the removal and/or addition of unknown amounts of soil during the flood control basin construction (Ref Nos. 1, p. A-1; 26).

The site is completely fenced with a locked gate along Centre Street. However, there is an open gate along High Street which permits access to the site. There is a high potential for a release of contaminants to both groundwater and surface water from the facility; however, groundwater and

PART VII: SITE SUMMARY AND RECOMMENDATIONS (Cont'd)

surface water in the area are used for industrial and commercial purposes only. A portion of the site is used as a baseball field and children were observed on site. Because of the high potential for direct contact with on-site wastes and contaminated surface soils to occur, a **LISTING SITE INSPECTION** is recommended for the Elizabeth Coal Gas Site #2. Recommendations for further work should include a soil boring program to determine the quantity and extent of the waste deposited, and soil sampling of nearby residential properties to determine whether or not contaminants have migrated off site. Due to the elevated concentrations of PAH compounds and other compounds generally associated with coal gas wastes that were detected in surface soils, it is also recommended that emergency action be taken to prevent access to the site by unauthorized personnel (i.e., children who pass through or use the ballfield on site).

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↑ Use data to justify total fencing if contam. found. ejm

EXECUTIVE SUMMARY

HIST. A potential hazardous waste site lies on a former coal gasification works property located adjacent to the Elizabeth River and partially beneath the Routes U.S. 1 & 9 Elizabeth River Viaduct in Elizabeth, Union County, New Jersey. This facility was formerly owned and operated by Elizabeth Gas Light Company. The property contains a portion of the right-of-way which the New Jersey Department of Transportation (NJDOT) plans to acquire as part of the Routes 1 and 9 - Elizabeth River Viaduct Eastern Alignment Widening.

PURPOSE The purpose of this screening investigation sampling program was to determine the presence and general distribution of any hazardous constituents within the project area. In addition, more complete soils classifications and geological profiles were developed to supplement the available data.

SAMP. PROG. The sampling program involved the drilling of 8 soil borings and excavation of 9 test pits for soils logging and to obtain soil samples for chemical analysis. The samples were distributed throughout the area potentially to be affected by the project, including the existing viaduct right-of-way and the proposed eastern alignment for the widening. Analytical parameters were selected in order to maximize information on wastes typically associated with coal gasification plants; specifically heavy metals, cyanides, phenolics, polynuclear aromatic hydrocarbons (PNAs or PAHs), and volatile compounds.

OLD TERM ↙ ↘ NEW TERM

STRAT. COLM. The four main soil and rock types encountered (in order of depth) in the subsurface investigation were: fill, brown fibrous organic silt, glacial drift deposits and red shale (Triassic Brunswick Formation). The total thickness of the unconsolidated deposits at the site ranges from approximately 11 to 19 ft. The upper 1 to 3 ft of the shale is decomposed. No borings were advanced past the decomposed veneer of the shale.

▽ 7'-10' H_2O TABLE DISCUSSION. Based on the subsurface investigations, groundwater was encountered between 7 and 10 ft below ground surface. In addition to the shallow water table, a perched water table zone was intersected in the northern portion of the site. Although a shallow water table was encountered during the field investigation, samples collected from the upper, decomposed shale appeared to be dry, indicating that (1) there may be negligible groundwater stored in the upper decomposed section of the Brunswick Formation; or (2) the overlying silt and clay is not serving, at least directly, as a confining or semi-confining layer to an aquifer in the shallow portion of the shale bedrock.

CONTAM. LEVELS. While there was little visual evidence of the disposal of coal gasification wastes, other than retort slag, every soil sample tested exceeded the NJDEP informal action levels for at least one parameter. The inorganics exceeding the action levels were limited to cadmium, lead, and cyanide. Polynuclear aromatics (PNAs) were the most significant organic contaminant (detected at concentrations ranging from over 40 ppm to 3090 ppm in eight of the twelve samples). High concentrations of other semi-volatile organic compounds were associated with very high PNA concentrations. In general, high lead concentrations were also associated with high PNA concentrations. Cadmium, however, follows almost the opposite pattern. In four of the six samples in which cadmium exceeds the action levels, it is the only contaminant in excess of the guidelines.

CONTAM. VS COAL WASTES

Although elevated levels of particular heavy metals and PNAs were detected in all soil samples tested, the source(s) for these levels cannot be established with the currently available information. Further investigation would be required to determine the relationship between the measured contaminants and coal gasification wastes. N.B.

VERY SLOW MIGRATION HORIZ. & VERT.

Because of the low hydraulic conductivities associated with the silt and clay, migration of any contaminants in groundwater should be very slow. Consequently, contaminant migration, either laterally off-site or vertically through the overburden and into the Brunswick Formation, should also be extremely slow. However, contamination detected in the fill material was also detected in the silt and clay deposits. It is possible that the silt material with elevated levels of heavy metals and organics has in the past been disturbed and mixed with the overlying fill material. *

CK. FOR BEDROCK CONTAM.

In any event, it is important to check whether elevated levels of metals or organics have migrated into the underlying bedrock. In order to assess this possibility, soil samples should be collected from the silt and clay deposits immediately above the bedrock and tested for the same chemical parameters measured during this screening investigation.

MONITOR WELLS, NO GOOD, in S+C.

There will be little usefulness in installing monitoring wells screened in the silts and clays. Because the silt and clay possess extremely low permeabilities and specific yields, collection of groundwater samples from any wells installed in this unit will be difficult. Of greater importance is determining whether or not a higher yield aquifer is present in the shallow portion of the underlying Brunswick shale. Information gathered during this survey indicates that groundwater is not present in the shallow, decomposed portion of the bedrock. This needs to be confirmed by additional borings. If contamination is detected in soil samples collected immediately above the shale unit, and if groundwater is detected in the shallow portion of the shale, monitoring wells intersecting the bedrock aquifer may be needed.

MONITOR WELLS MAY BE NEEDED INTO THE BEDROCK AQUIFER... IF ONE DOES EXIST.

ROUTES U.S. 1 & 9
ELIZABETH RIVER VIADUCT
South Street Gas Works Site

SCREENING INVESTIGATION REPORT

1. INTRODUCTION

A potential hazardous waste site lies on a former coal gasification works property bounded by South Street, Fourth Avenue, Center Street and the Elizabeth River in Elizabeth, Union County, New Jersey. This facility was formerly owned and operated by Elizabethtown Gas Light Company. The property contains a portion of the right-of-way which the New Jersey Department of Transportation (NJDOT) plans to acquire as part of the U.S. Routes 1 and 9 -Elizabeth River Viaduct Eastern Alignment Widening.

The purpose of this screening investigation sampling program was to determine the presence and general distribution of any hazardous constituents within the project area. In addition, more complete soils classifications and geological profiles were developed to supplement the available data. The field program was conducted by TAMS CONSULTANTS, Inc. from January 27 to February 5, 1987. Final data from subcontractors were received by March 17.

2. SITE HISTORY AND BACKGROUND

2.1 Historical Background

The original gasification works property consisted of 2.7 acres along the east bank of the Elizabeth River. This area is depicted on the Elizabeth, New Jersey USGS Quandrangle, a portion of which is reproduced as Figure 1 to show the general site location. Figure 2 shows the site as it existed in 1903, as compiled from Sanborne insurance maps, and superimposed on its current configuration. A preliminary assessment of the site conducted by Malcolm Pirnie, Inc. in March 1985[1] indicates that the plant was in operation from 1855 to 1901.

The South Street Gas Works manufactured coal gas and producer gas.[2] It is assumed that the producer gas was not transported off site, but used as a fuel source for the coal gas process due to its low heating value.[3] The coal gas was probably piped to consumers via a network of underground pipes.

A portion of the plant site was taken by NJDOT in 1929 for construction of the existing viaduct. The viaduct was constructed with some plant structures remaining intact beneath it, as shown in aerial photographs from 1940 and 1951.[4] The coal shed was removed from under the viaduct some time after 1951. The gas holders and some other structures have also been removed. Portions of the property between the viaduct and the river were obtained by the City of Elizabeth in 1978 to 1980 for construction of flood control structures by the U.S. Army Corps of Engineers.

Vignola Haulage of NJ, Inc. is currently operating a transfer and maintenance facility on the portion of the site to the east of the existing viaduct. Two of the original site structures (including an office and the retort house) were converted for the present operation, and other new structures were built.

2.2 Geological Background

Physiography

The site is located in the Triassic lowland section of the Piedmont physiographic province. The Piedmont province is chiefly a lowland of gently rounded hills separated by wide valleys, some ridges, and isolated hills rising conspicuously above the general surface. The elevation of the surrounding area of the viaduct ranges from 5 to 20 ft (NGVD). Surface streams and drainage paths generally flow into the Elizabeth River and subsequently into the Arthur Kill.

Geology

The Elizabeth River Viaduct and the coal gasification plant are underlain by a thin mantle of glacial drift deposited as part of the ground moraine. This deposition took place during the Wisconsin glaciation period. Underlying the glacial drift is bedrock of the Brunswick Formation. The formation is mainly composed of a red to reddish brown shale with interbedded mudstone, siltstone and sandstone. The shale dips in a westerly to northwesterly direction. Recent alluvium composed of non-residual materials deposited by alluvial action overlies the glacial deposits bordering the Elizabeth River.

Soils

Soil information was made available from borings carried out by the Corps of Engineers for the Elizabeth Flood Control Project.[6] The following subsurface conditions exist in the central portion of the study area which borders the Elizabeth River Viaduct and the former coal gasification plant:

- The uppermost layer consists of recent fill materials that are composed of either earth fill (sandy silt with trace to some gravel) or miscellaneous fill (silt, cinders, bricks, etc.). This layer varies in thickness from 3 to 8 ft and is generally of medium dense compactness.

- The underlying layer extends down to the surface of glacial deposits and consists of soft to medium stiff gray to black organic silt and black peat.

- Glacial material underlying the organic soils extends down to bedrock and generally consists of medium dense to dense red to red-brown silt. The thickness of this layer ranges from 2 to 5 ft.

Borings drilled alongside the Elizabeth River indicate bedrock consists of red-brown shale at a depth ranging from 8 to 18 ft below the existing ground surface. The upper 1 to 2 ft of shale is decomposed.

Hydrogeology

Information obtained from the Corps of Engineers for the Elizabeth Flood Control Project[6] indicates the groundwater levels near the former coal gasification plant seem to fluctuate between depths of 3 to 6 ft below the existing ground surface. The local hydraulic gradient of the groundwater system is assumed to flow towards the Elizabeth River. No domestic or monitoring wells have been identified in the vicinity of the coal gasification plant or the viaduct.

3. SCREENING PHASE SAMPLING PROGRAM

The sampling program involved the drilling of soil borings and excavation of test pits to obtain soil samples for chemical analysis. The samples were distributed throughout the area potentially to be affected by the project, including the existing viaduct right-of-way and the proposed eastern alignment for the widening. All samples were analyzed for USEPA Priority Pollutants plus 40 peaks (or selected fractions) and provided with NJDEP Tier II deliverables by Weston Analytics of Lionville, Pennsylvania. Analytical parameters were selected in order to maximize information on wastes typically associated with coal gasification plants; specifically heavy metals, cyanides, phenolics, polynuclear aromatics (PNAs, or PAHs), and volatile compounds.

The Screening Investigation did not include any water samples. It was believed that the project would best be served by focusing on collection and analysis of soil samples during this screening investigation. Therefore, the plan included a total of 11 soil samples; 8 from borings and 3 from test pits with an allowance for 2 additional discretionary samples.

TAMS' initial site visit on December 16, 1986 confirmed that there is slow flowing water in a drainage area adjacent to the flood control barrier along the river. This area serves as a shallow "channel" to carry runoff from a region to the south of the site designated on project mapping as a "Ponding Area" and is part of the original gas works property. This surface water has a strong odor of raw sewage and has spots of oil sheen in places. It is likely that these substances have origins other than coal gasification wastes (e.g., the river itself and runoff from city streets). The initial site visit revealed a number of locations near the viaduct where waste oil appeared to have been dumped in small quantities.

The initial site visit also revealed quantities of retort slag scattered about open areas of the site, both under the viaduct and in areas disturbed by construction of flood control facilities. This indicates on-site burial of waste materials. It was not known prior to this investigation whether any liquid coal tars were buried or deposited on site. Coal tar was a saleable product during the time this plant was operated, but lower grade tars or tar-water mixtures may have been disposed on land or in the river.

3.1 Preparatory Activities and Investigation Facilities

Prior to commencement of sampling activities at the site, utilities were notified by the subsurface investigation subcontractor so that they could delineate buried gas, water, sewer or electric lines within the project area. City of Elizabeth Water Department personnel aided in tracing a sewer line, evidenced by a manhole cover under the viaduct near South Street. In addition, certain sampling locations were screened with a magnetic locator prior to drilling or excavation.

Other preparatory activities included staking sampling locations and setting up and furnishing the equipment and personnel decontamination center and a command post. The decontamination center was situated underneath the viaduct (as shown on Figure 2) so as to be on NJDOT property and somewhat sheltered from the weather. The command post was established in a room rented from Vignola Haulage. However, field equipment was taken to the work area in the sampling van. The van was outfitted with a fire extinguisher, first aid kit,

5.2 Hydrogeology

Based on the subsurface investigations, groundwater was encountered between 7 and 10 ft below ground surface (approximate elevation 58.0 ft (NGVD). In addition to the shallow water table, a perched water table zone was intersected in the northern portion of the site at test pit location TP-1C and boring location B-1. Depth to groundwater in the perched zone was approximately 4 ft below ground surface in test pit TP-1C (elevation 63.1) and 5.5 ft below ground surface at boring location B-1 (elevation 62.2).

Although a shallow water table was encountered during the field investigation, the preponderance of clay, silt and clayey sand in the subsurface indicates very low permeability sediments with negligible specific yield. While the low permeability sediments overlying the Brunswick shale could serve as a confining (or semi-confining) layer for groundwater residing in the bedrock shale, samples collected from the upper, decomposed shale appeared to be dry, indicating that (1) there may be negligible groundwater stored in the upper decomposed section of the Brunswick Formation; and/or (2) the overlying silt and clay is not serving, at least directly, as a confining or semi-confining layer to an aquifer in the shallow portion of the shale bedrock.

N.B.

5.3 Chemical Testing Results

Data for inorganic and organic chemicals are summarized in Tables 1 and 2, respectively. Data are compared to the New Jersey Informal Action Levels (hereinafter referred to as Action Levels). The complete Tier II laboratory reports of chemical testing data and copies of the Chain-of-Custody forms are included as Appendix G.

CN 188 PPM (AL 12 PPM)

Test Pit 1A The sample from TP-1A was taken from a depth of about 8 ft. Lead was found slightly in excess of the Action Levels (104 ppm vs 100 ppm); however, the main contaminant of concern is cyanide (188 ppm), which seriously exceeds the Action Levels (12 ppm). In addition, polynuclear aromatics (PNAs) were detected at about 73 ppm; other organics were not detected in significant amounts.

The peaty material from this pit was sampled due to the relatively high PID readings obtained in the field (50 to 100 ppm). The analytical data for this particular sample does not correlate with the PID reading obtained for the material.

N.B.

CN 18 PPM. Cd 3.1 PPM (AL 3 PPM). V4

Test Pit 1C The sample was taken from about 3 ft deep. During the excavation of this pit, significant breathing zone concentrations of volatiles were detected by the HNu (3 to 8 ppm). As a result, all personnel went to Level C respiratory protection. However, only trace levels of volatiles were detected in the sample. PNAs were found at moderate levels (41.3 ppm). Inorganic contamination was generally low; however, cyanide (18 ppm) exceeded the guidelines by 50% and cadmium (3.1 ppm) was slightly in excess of the guidelines (3 ppm).

The water table was encountered at 4 ft below grade at this location, at which depth excavation of the pit was terminated.

CN 359 PPM PNAs 3090 PPM, plus 9 other semi-volatiles.

Test Pit 2B Whitish material (perhaps lime or lime-sludge associated with plant water treatment) from about 3 to 3.5 ft was sampled from this pit. High levels of cyanide (359 ppm) were found; however, no other inorganics were detected at levels of concern. No volatile organics were detected in significant amounts; however, semi-volatiles were present. PNAs were very high, at 3090 ppm (0.3%); nine other semi-volatiles (including dibenzofuran [7.2 ppm], phenol [3.7 ppm],, and acenaphthylene [13.0 ppm]) were detected at concentrations ranging from 1.7 to 13 ppm.

PNAs 536 PPM

Test Pit 3A Gray clay from a depth of about 8 ft was sampled from this pit. No inorganics were present at levels in excess of Action Levels. The only organics present in significant amounts were PNAs (53.6 ppm). Several other volatile and semi-volatile organics were detected at trace to low (less than 2.0 ppm) concentrations.

Cd B-1=5.7 PPM B-2=3.8 PPM

Test Boring 1 and Test Boring 2 Both samples were taken in the yard of Vignola Haulage, from 8 ft and 9.5 ft deep, respectively. No organic contaminants were detected in quantifiable amounts in either sample. These two samples were the only two analyzed for pesticides and PCBs, and none were detected.

Inorganic contamination detected was generally low, although cadmium was in excess of the Action Levels in both B-1 (5.7 ppm) and B-2 (3.8 ppm).

Pb 153 PPM (AL 100 PPM). PNAs 2200 PPM, plus 4 other semi-volatiles, Phenols 24.1 PPM

Test Boring 3 This sample was a composite of the 5 ft to 9 ft interval. (Sample recovery in the split spoons was low, which necessitated compositing several spoons to obtain sufficient sample volume for analysis.) Lead (153 ppm) was the only inorganic constituent detected in excess of the guidelines (100 ppm). However, PNAs were significant (almost 2200 ppm, or 0.22%), and four other semi-volatiles (naphthalene, 2-methylnaphthalene, acenaphthylene, and dibenzofuran) were detected at concentrations ranging from 120 to 330 ppm. Although this sample was not analyzed for the acid extractable fraction (which includes several of the phenols), it did have the highest level of total phenols (24.1 ppm) of any of the samples.

In addition, volatile organic compounds (all aromatics) were detected at concentrations ranging from 33 to 740 ppb, and totaling about 1.1 ppm. The Action Level for total volatiles in soil samples is currently 1.0 ppm. N.B.

PNAs 563 PPM Naphthalene 44 PPM

Test Boring 4 The material selected for chemical analysis from this boring was taken from approximately 1.5 to 3 ft deep and had an asphalt-like odor, although PID readings were at background levels. No significant levels of volatile organics were detected (carbon disulfide was reported at 71 ppb); however, PNAs (563 ppm) and napthalene (44 ppm) were detected in significant levels.

PNAs 2500 PPM Pb 2500 PPM, plus 5 more semi-volatiles.

Test Boring 5 There was no overt evidence of contamination in this boring, so the 6 ft to 8 ft interval was arbitrarily selected for chemical analysis. PNAs and lead were both present in high concentrations (about 0.25% or 2500 ppm each). Five other semi-volatiles were also detected at concentrations ranging from 60 to 710 ppm.

Only low levels of volatiles (totaling less than 150 ppb) and inorganics (except lead) were detected.

Cd 3.6 PPM (AL 3 PPM). Test Boring 6 The two deepest split spoons (12 to 14 ft, and 14 to 16 ft) were composited for analysis from boring 6. Only cadmium (3.6 ppm) was found in excess of the Action Level (3.0 ppm). The only organic contaminants detected were carbon disulfide (trace) and di-n-butyl phthalate (0.4 ppm).

PNAs 2200 PPM, plus 4 other semi-volatiles. Test Boring 7 The sample selected for analysis was taken from about 5.5 ft deep, since the PID reading on the material was about 1 to 2 ppm above background. Low levels of volatiles, mainly aromatics, were found, totaling about 0.6 ppm. However, high levels of PNAs (2200 ppm) and four other semi-volatile organics (ranging from 190 to 810 ppm) were detected.

Pb 847 PPM Of the inorganics, lead (847 ppm) and cadmium (4.2 ppm) exceeded the Action Levels.

Cd 4.2 PPM Test Boring 8 The sample from boring 8 was taken from the 13 to 14 ft interval, due to PID readings from 1 to 2 ppm above background. However, only very low concentrations of organics were detected (traces of carbon disulfide and di-n-butyl phthalate, and PNAs at 1.7 ppm). Cadmium (4.9 ppm) was the only inorganic in excess of the Action Levels.

Cd 4.9 PPM

6. CONCLUSIONS

N.B. Every soil sample tested exceeded the Action Levels for at least one parameter. However, the contaminants detected at significant concentrations were fairly limited. The inorganic constituents exceeding their Action Levels were limited to cadmium, lead, and cyanide. Polynuclear aromatics (PNAs) were the most significant organic contaminant (detected at concentrations ranging from over 40 ppm to 3090 ppm in eight of the twelve samples). Other semi-volatiles (generally dibenzofuran and napththalenes) were also detected at concentrations of up to 810 ppm in several samples; however, in all cases high concentrations of these compounds were associated with very high PNA concentrations. These findings are particularly interesting in light of the very limited visual evidence of coal gasification wastes. In general, high lead concentrations were also associated with high PNA concentrations. Cadmium, however, follows almost the opposite pattern. In four of the six samples in which cadmium exceeds the Action Level (B-1, B-2, B-6, and B-8), it is the only contaminant in excess of the guidelines.

Although elevated levels of particular heavy metals and PNAs were detected in all soil samples tested, [redacted] cannot be established with the current[redacted]. Further investigation would be required to determine the relationship between the measured contaminants and coal gasification wastes.

Because of [redacted] conductivities (K) associated with the silt and clay (esti[redacted] migration of any contaminants in groundwater should be very slow. Consequently, contaminant migration, either laterally off-site or vertically through the overburden and into the Brunswick Formation, should also be extremely slow. However, contamination detected in the fill material is also detected in the silt and clay deposits. It is possible that the silt material with elevated levels of heavy metals and/or organics has in the past been disturbed and mixed with the overlying fill material.

02-9004-38-SI
REV. NO. 0

FINAL DRAFT
SITE INSPECTION REPORT
ELIZABETH COAL GAS SITE #2
ELIZABETH, NEW JERSEY
VOLUME 1 OF 2

PREPARED UNDER

TECHNICAL DIRECTIVE DOCUMENT NO. 02-9004-38
CONTRACT NO. 68-01-7346

FOR THE

ENVIRONMENTAL SERVICES DIVISION
U.S. ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 17, 1990

NUS CORPORATION
SUPERFUND DIVISION

SUBMITTED BY:

DAVID J. GRUPP
PROJECT MANAGER

REVIEWED/APPROVED BY:

RICHARD M. SETTINO
SITE MANAGER

RONALD M. NAMAN
FIT OFFICE MANAGER

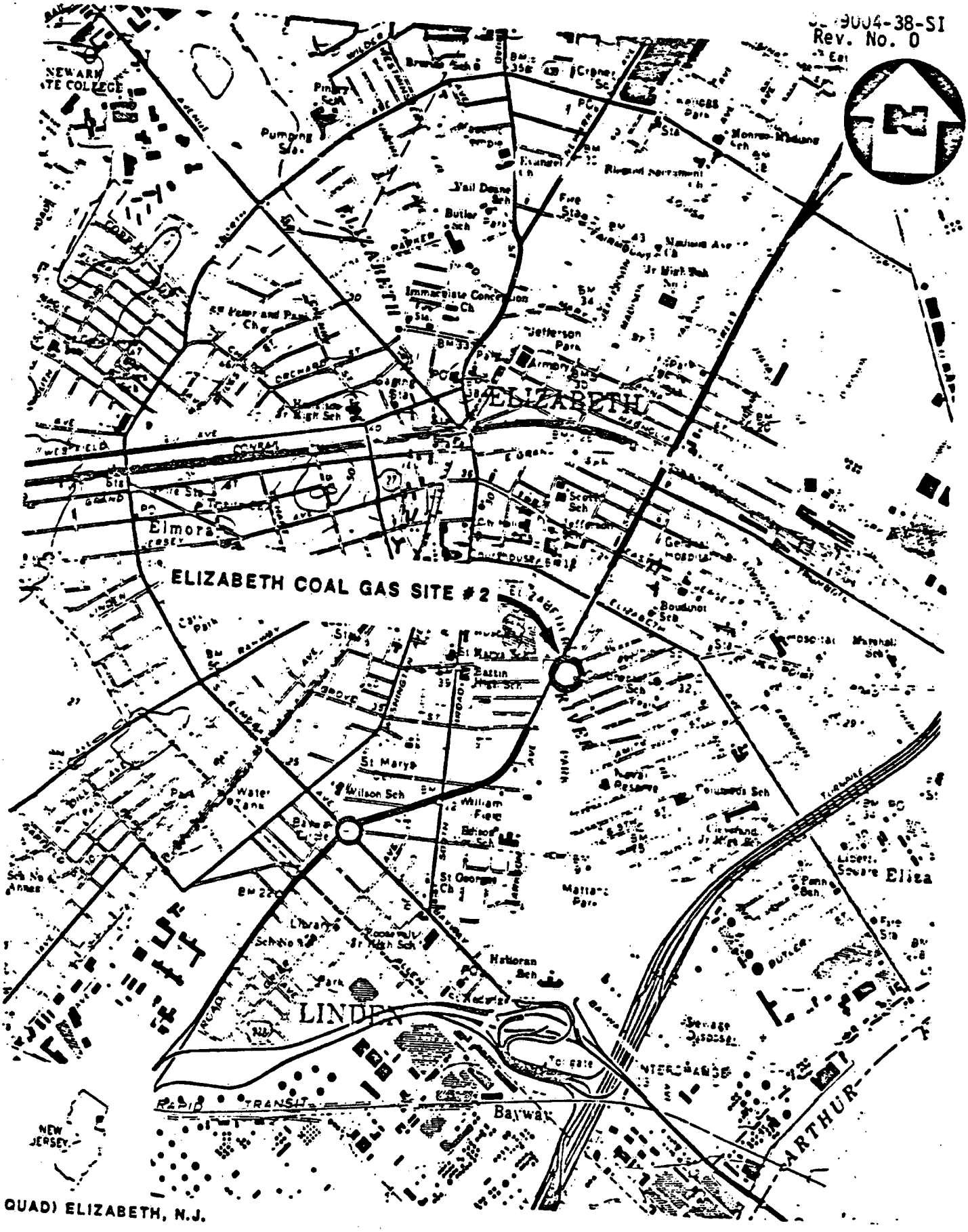
PART II: WASTE SOURCE INFORMATION

The site was used for the production of coal gas from 1855 to approximately 1901. The uses of the site from 1901 until its present uses by a salvage company and for flood control are unknown. Wastes produced on site were the result of the gasification processes. These wastes typically include ammonia, amonium sulfate, sulfur, coke, coal tar, coal tar pitch, clinker, and light oils. The coal tar may contain significant concentrations of pyrene, anthracene, and other polynuclear aromatic hydrocarbons (PAHs), including known or suspected carcinogens (Ref. No. 1, p.4 and Attachment B). Actual waste handling practices that occurred at the plant are largely unknown. Wastes were reported to be disposed of in unlined pits primarily on the northern portion of the site and most likely extended into the southern portion also. Low grade tar and tar-water mixtures along with spent oil were most likely dumped on site. During an NUS Corp. Region 2 FIT site inspection a substance assumed to be coal was discovered in on- site soils, and a substance assumed to be solidified coal tar was encountered while collecting a subsurface soil sample (Ref. No. 2). It is reported that some remedial action was taken by the Elizabethtown Gas Light Company; however, the time and extent of remediation are unknown (Ref. No. 26).

The structures that existed on site in 1903 are as follows: two gas storage tanks of unknown size, two sheds, a blacksmith shop, a purifying house, a retort building, two coal sheds, an engine house, and an office building (Ref. No. 1, p. 9). Aerial photographs show that most of the structures were removed from the site between 1959 and 1966 (Ref. No. 10). The retort house and office building still exist on site (Ref. No. 1). Figures 1 and 2 provide a Site Location Map and a present day Site Map, respectively. Figure 3 shows a Site Map of the former facility as it existed in 1903. There is no known containment associated with the waste pits. Potential for direct contact is high since there is a public-access baseball field located on the southern portion of the site (Ref. No. 2). The exact quantity of wastes deposited, as well as the size or exact location of any pits that currently exist or formerly existed on site, is unknown.

PART III: PRE-EXISTENT ANALYTICAL DATA

From January 27 to February 5, 1987, eight soil borings were drilled and nine test pits were excavated on site by TAMS Consultants, Inc. (TAMS). Soil samples were collected from the borings and pits at this time for chemical analysis. All samples were analyzed for U.S. EPA Priority Pollutants plus 40 peaks (or selected fractions) and provided with NJDEP Tier II' deliverables by Weston Analytics of Lionville, Pennsylvania Analytical parameters included heavy metals, cyanide, phenolics, polynuclear aromatic hydrocarbons (PAHs), and volatile organic compounds. The area investigated was only in the northern portion of the site immediately under the viaduct. This area was to be used by the New



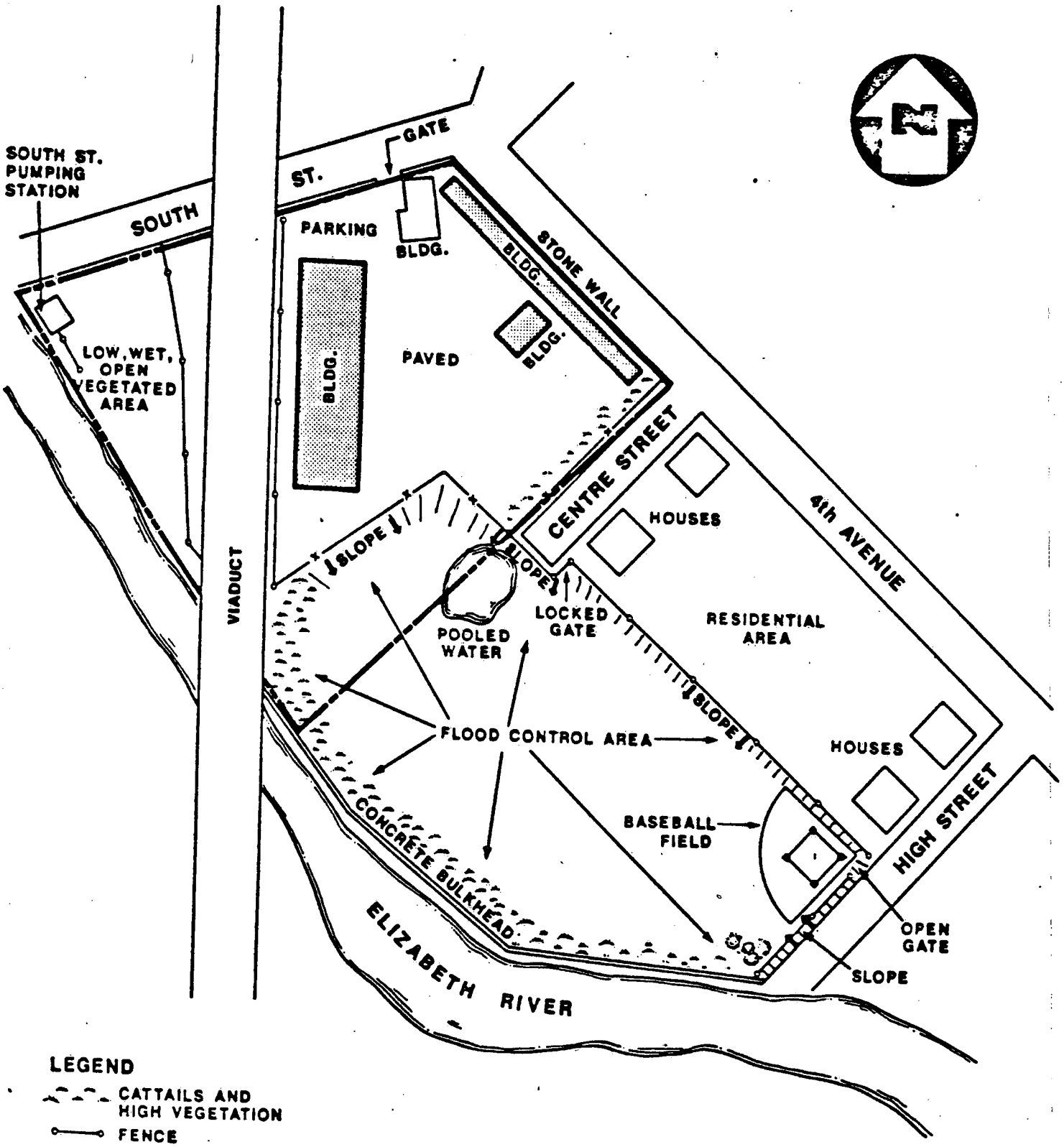
SITE LOCATION MAP

ELIZABETH COAL GAS SITE #2, ELIZABETH, N.J.

SCALE: 1" = 2000'

FIGURE 1

NUS CORPORATION



LEGEND

- CATTAILS AND HIGH VEGETATION
- FENCE
- BARBED WIRE FENCE
- APPROX. ORIGINAL SITE BOUNDARY

SITE MAP

ELIZABETH COAL GAS SITE #2, ELIZABETH, N.J.

NOT TO SCALE

FIGURE 2

NUS

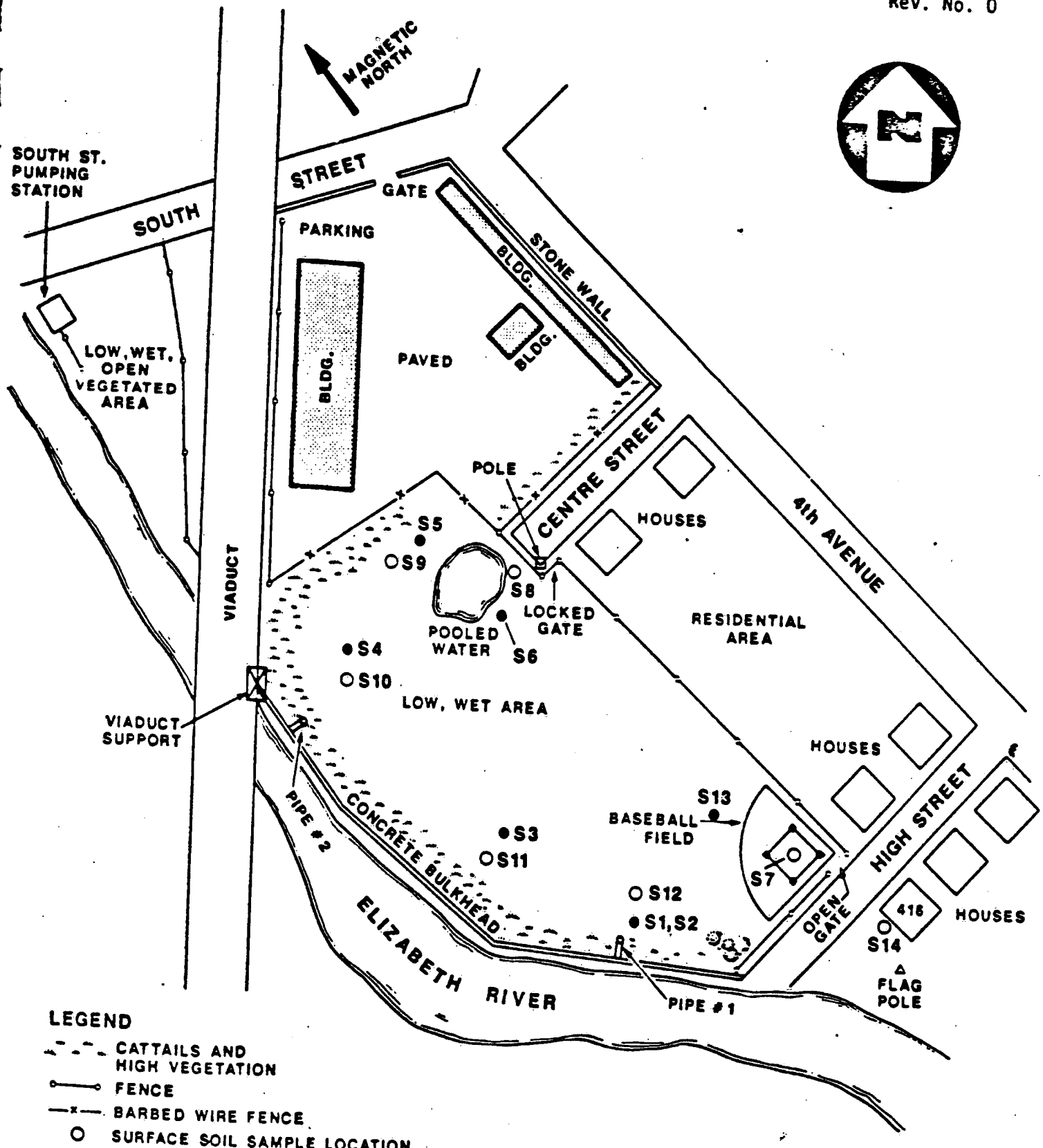
Jersey Department of Transportation (NJDOT) to widen the viaduct. The TAMS investigation did not include screening of the entire site. Refer to Reference No. 3, Figure 2 for the locations of the borings and test pits.

TAMS reported little visual evidence of coal gasification wastes to be present in these borings and test pits, with the exception of some subsurface retort slag. However, every soil sample tested exceeded the New Jersey Department of Environmental Protection informal action levels for at least one parameter. The inorganics exceeding action levels included cadmium, lead, and cyanide. Inorganic analyses are presented in Reference No. 3, Table 1. The most significant concentrations of organic contaminants detected were for PAHs, ranging from over 40 parts per million (ppm) to 3,090 ppm in eight of the twelve samples taken. High concentrations of other semivolatile organic (dibenzofuran and naphthalenes) and inorganic (lead) compounds were detected in association with the high PAH concentrations. Reference No. 3, Table 2 presents organic analysis results (Ref. No. 3).

PART IV: SITE INSPECTION SAMPLE RESULTS

The NUS Corporation Region 2 FIT (FIT) conducted a sampling site inspection at the Elizabeth Coal Gas Site #2 on June 12, 1990, during which seven surface and seven subsurface soil samples were collected (Ref. No. 2). The soil samples were collected to determine if any soil contamination or waste exists that can be attributed to previous coal gasification operations and to assess the potential for direct contact with contaminants present. The samples were analyzed under the Contract Laboratory Program(CLP) for Target Compound List (TCL) organic and inorganic constituents, including cyanide. All NUS Corporation Region 2 FIT analytical data sheets are provided in Ref. No. 27 of this report. Refer to Figure 4 for all sample locations and to Table 1 for a summary of the organic compounds detected in the soil samples. In the following discussion, all soil sample numbers are preceded by NJGA.

The site can be divided into two sections: the northern portion of the site occupied by Vignola Salvage Corp. and the southern portion owned by Union County. The northern portion of the site was previously sampled by TAMS Consultants, Inc and the data are summarized above. The FIT collected 13 surface and subsurface soil samples (S1 to S13), including a duplicate, from the southern portion of the site, and one surface soil sample (S14) from a residential property, located on the south side of High Street, to serve as a background sample. Sample locations were determined by using a thin-walled tube sampler at random subsurface locations around the site and marking the areas where waste was encountered and/or where readings significantly above background were registered on the HNU or OVA air monitoring instruments. No visual waste was encountered while using the tube sampler to determine the actual sample locations; however elevated readings



SAMPLE LOCATION MAP

ELIZABETH COAL GAS SITE #2, ELIZABETH, N.J.

NOT TO SCALE

FIGURE 4

NUS

TABLE 1: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES COLLECTED AT THE ELIZABETH COAL GAS SITE #2 BY THE NUS CORP. REGION 2 FIT ON JUNE 12, 1990

COMPOUND	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14
VOLATILES														
Carbon Disulfide	J	J	ND	ND	10,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	J	82,000E	ND	7	J	J	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	59,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	14,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
Total Xylenes	ND	ND	ND	25	68,000E	ND	ND	ND	ND	ND	ND	ND	ND	ND
SEMIVOLATILES														
Naphthalene	J	J	J	2,200	270,000E	ND	J	950	1,300	J	J	J	ND	J
2-Methylnaphthalene	J	J	J	J	3,300,000E	ND	ND	J	J	J	J	J	ND	J
Acenaphthylene	J	J	J	3,600	2,600,000E	ND	J	2,300	3,700	2,100	990	J	ND	J
Acenaphthene	J	850	J	1,100	460,000E	ND	J	J	J	J	J	J	ND	J
Dibenzofuran	J	J	J	ND	2,300,000E	ND	ND	J	860	J	J	J	ND	J
Phenanthrene	2,900	5,300	3,600	44,000	220,000E	ND	740	11,000	20,000	7,900	5,200	3,700E	ND	10,000
Anthracene	1,300	2,800	1,300	7,600	2,900,000E	ND	J	3,800	5,200	1,700	1,300	1,200E	ND	J
Flouranthene	7,700	11,000	8,400	140,000	140,000E	ND	2,300	27,000	34,000	12,000	12,000E	7,900E	J	9,600
Pyrene	7,800	10,000	8,600	140,000	140,000E	ND	2,900	26,000	32,000	9,200	8,400	5,700E	ND	8,800
Fluorene	J	J	J	2,200	2,500,000E	ND	ND	1,400	1,700	J	J	J	ND	J

Notes:

All results reported in ug/kg
E = Estimated Value
ND = Not Detected
J = Estimated value, compound present below CRQL but above IDL

Ref. No. 27

TABLE 1: SUMMARY OF ORGANIC COMPOUNDS DETECTED IN SOIL SAMPLES COLLECTED AT THE ELIZABETH COAL GAS SITE #2 BY THE NUS CORP. REGION 2 FIT ON JUNE 12, 1990 (CONT'D)

COMPOUND	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14
SEMIVOLATILES (CONT'D)														
Benzo(a)anthracene	5,900	7,200	5,600	74,000	2,500,000E	ND	1,600	14,000	16,000	12,000	7,100	3,600E	ND	3,600
Chrysene	5,400	7,800	5,800	140,000	2,800,000E	ND	1,500	22,000	27,000	12,000	9,200	4,400E	ND	5,400
Benzo(b)fluoranthene	4,900	5,300	4,600	82,000	1,500,000E	ND	1,700	14,000	16,000	16,000E	8,400	5,100E	ND	5,000
Benzo(k)fluoranthene	2,900	3,800	3,200	ND	1,400,000E	ND	ND	7,600	ND	ND	3,800	2,500E	ND	ND
Benzo(a)pyrene	3,700	3,700	3,100	94,000	1,900,000E	ND	1,200	9,600	4,100	9,000	6,100	3,600E	ND	3,300
Indeno(1,2,3-cd)pyrene	3,200	3,200	2,800	73,000	1,000,000E	ND	1,000	8,700	8,900	8,200	5,200	2,700E	ND	2,500
Dibez(a,h)anthracene	1,900	1,700	1,700	11,000	570,000E	ND	J	6,000	5,100	3,500	2,200	1,100E	ND	940
Benzo(g,h,i)perylene	2,800	2,800	2,500	57,000	870,000E	ND	830	8,400	8,000	8,400	3,900	2,100E	ND	3,000
PESTICIDES														
4,4'-DDT	ND	ND	ND	ND	ND	ND	ND	230	220E	J	J	ND	ND	J

Notes:

All results reported in ug/kg.
E = Estimated Value
ND = Not Detected
J = Estimated value, compound present below CRQL but above IDL

Ref No 27

02-9004-38-SI
Rev. No. 0

PART VII: SITE SUMMARY AND RECOMMENDATIONS

The Elizabeth Coal Gas Site #2 is an inactive former coal gasification site located in a mixed urban residential and industrial area between South Street, High Street, Fourth Avenue, and the Elizabeth River under the U. S. Routes 1 and 9 Viaduct in Elizabeth, New Jersey. The site is comprised of approximately 2 acres and can be divided into two sections. The northern section of the site is an active salvage area while the southern portion is inactive and is used for flood control and as a public-access baseball field

The site has been owned by Elizabethtown Gas Light Company since 1855 and was used to manufacture coal gas until approximately 1901. Coal gas operations took place primarily in the northern portion of the site but most likely extended into the southern portion also. Presently, the northern section of the property is still owned by Elizabethtown Gas Light Company but is operated by Vignola Salvage Corp. as a storage and light industrial facility. The sourthern half of the property was donated to the Union County Department of Parks and Recreation by the City of Elizabeth in 1953. This part of the property is part of a flood control project. A small rectangular parcel of property, which encompasses the baseball diamond itself, is owned by the Church of Saint Anthony (Ref. No. 28).

Actual waste handling practices used at the plant during the time of coal gas production are largely unknown. It is very likely that coal and coke were stored on site in large piles. Waste materials which were not marketable, such as poor quality tars and oils, were probably deposited in unlined pits on site. Analytical results of surface and subsurface soil samples taken during the NUS Region 2 FIT site inspection indicate the presence of elevated concentrations of compounds associated with coal gas manufacturing wastes. A substance assumed to be solidified coal tar was encountered at sample location SS, and elevated levels of various organic compounds including high levels of polynuclear aromatic hydrocarbons (PAHs) were detected in a sample of the material. Although levels of PAHs were generally higher than those found in the sample that was intended to represent the background conditions, in many instances "background" levels for other compounds detected were comparable to or higher than those found in some on-site soil samples. This indicates that either those on-site samples are unaffected by facility wastes or that the residential area where the "background" sample was collected has been impacted by the site. Some remedial action has been reported to have occurred at the site along with the removal and/or addition of unknown amounts of soil during the flood control basin construction (Ref Nos. 1, p. A-1; 26).

The site is completely fenced with a locked gate along Centre Street. However, there is an open gate along High Street which permits access to the site. There is a high potential for a release of contaminants to both groundwater and surface water from the facility; however, groundwater and

PART VII: SITE SUMMARY AND RECOMMENDATIONS (Cont'd)

surface water in the area are used for industrial and commercial purposes only. A portion of the site is used as a baseball field and children were observed on site. Because of the high potential for direct contact with on-site wastes and contaminated surface soils to occur, a **LISTING SITE INSPECTION** is recommended for the Elizabeth Coal Gas Site #2. Recommendations for further work should include a soil boring program to determine the quantity and extent of the waste deposited, and soil sampling of nearby residential properties to determine whether or not contaminants have migrated off site. Due to the elevated concentrations of PAH compounds and other compounds generally associated with coal gas wastes that were detected in surface soils, it is also recommended that emergency action be taken to prevent access to the site by unauthorized personnel (i.e., children who pass through or use the ballfield on site).

ATTACHMENT B

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Centers for Disease Control

Memorandum

Date: February 21, 1991

From: Environmental Health Scientists, Emergency Response and Consultation Branch (ERCB), Division of Health Assessment and Consultation (DHAC), ATSDR (E32)

Subject: Health Consultation: Elizabeth Coal Gas Site
Elizabeth, Union County, New Jersey

To: Lisa Voyce, Regional Representative
ATSDR Region II
Through: Director, DHAC ATSDR (E32) Kay L. Dow
Acting Chief, ERCB, DHAC, ATSDR (E32) for JHE

BACKGROUND AND STATEMENT OF ISSUES

The U.S. Environmental Protection Agency (EPA) Region II asked the Agency for Toxic Substances and Disease Registry (ATSDR) to review surface and subsurface soil data associated with the Elizabeth Coal Gas Site (ECG) and to advise them on the health risk implications of the contaminants detected on-site.

The ECG consists of approximately 2 acres. It is bordered to the north by light industry, to the west and south by the Elizabeth River, and to the southeast and east by residential areas. Several schools are located within a 1 to 1/2 mile radius of the site. Although the public access to the site is possible through open gates or unfenced areas, the majority of the site is fenced or surrounded by a concrete bulkhead along the river or a stone wall along other portions of the site.

Historically, the site was used for the production of coal gas from 1855 to about 1901. Unknown quantities of wastes and most likely coal tar or oil still bottoms were reportedly dumped in lined pits on-site. The exact size, numbers, and locations of these pits are not known. Based on observations at similar sites, disposed wastes probably included or contained ammonia, ammonium sulfate, sulfur, coke, coal tar pitch, clinker, and light oils.

Over the years, a number of structures were built on-site. However, only the retort house and an office building still exist from the coal gas era and are located in the northern half of the site. Presently, the northern half of the site is used by an active salvage yard for storage and light industry. The southern half is used for flood control and as a public baseball field. Children have been observed on-site. Little information is known about the use of the site since 1901.

In January of 1987, eight soil borings were drilled and nine test pits were excavated on-site. The contaminants found at that time included elevated concentrations of polyaromatic hydrocarbons (PAHs), ranging from over 40 parts per million (ppm) to 3,090 ppm. Elevated concentrations of dibenzofuran, naphthalene, and lead were also detected. Information about the locations of the sampling areas was not provided for this Health Consultation.

Sampling of the southern half of the site was again conducted in 1990. Six surface soil samples and seven subsurface soil samples were collected and analyzed for organic and inorganic contaminants. One surface soil sample was obtained from an off-site area across the street from the public baseball field (see attachment).

Surface soil samples contained concentrations of PAHs ranging from 13-184 ppm. The highest concentrations of PAHs (102-184 ppm) were detected in areas around the pooled water on-site (S8 and S9). Cyanide (2.2 ppm) was detected in one surface soil location (S8). Surface soil samples contained concentrations of lead ranging from 14-314 ppm. The pooled water on-site was not sampled.

DOCUMENTS AND INFORMATION REVIEWED

1. Final Draft Site Investigation report Elizabeth Coal Gas Site #2, Elizabeth, N.J. Vol. 1 of 2, Sept. 17, 1990

2. ATSDR, Toxicological Profile for Cyanide, ATSDR/TP-88/12, December 1989.

3. ATSDR, Toxicological Profile for Polycyclic Aromatic Hydrocarbons, Draft for Public Comment, February 1990.

4. ATSDR, Toxicological Profile for Lead, ATSDR/TP-88/17, June 1990.

DISCUSSION

Since the site is used by the public as a recreational area (baseball field), feasible exposure pathways at this site include direct dermal contact with the soils and, possibly with the pooled water. Consumption of the pooled water is unlikely.

Available data from toxicity studies in laboratory animals have shown that long-term exposures to a number of the PAHs via the oral and dermal routes could cause cancer. Reports in humans have shown that humans exposed by dermal contact

for long periods of time may also develop cancer. Direct contact with the PAHs may also result in skin and eye irritation. Levels of PAHs in at least one area of the site are at levels that could be of public health concern. However, frequency of contact will determine potential for adverse health effects to occur.

Based on experimental evidence in animals and observations in humans exposed to cyanide, the cyanide level of 2.2 ppm in surface soil found in one discrete sample is not likely to pose a human health concern. A child would have to ingest several hundred grams of soil containing cyanide at this level in the course of 1 day before any acute health effects would be expected to occur. Typical estimates of daily soil ingestion by children ranges from 0.01 to 10 grams to include pica behavior. Chronic ingestion of the soil containing cyanide at the levels detected would not be expected to lead to adverse health effects.

Current understanding of the contribution of lead in soil to the total body burden in children suggests that the maximum lead levels detected in the soil samples at this site would not be expected to lead to adverse health effects in children, particularly if this is the only source for lead exposure. If, however, children are being exposed to levels of lead through other sources, such as through drinking water or lead-based paints, chronic exposure to lead concentrations on-site could further contribute to a total body burden of lead.

CONCLUSIONS

Based on the reviewed information, ATSDR concludes that the levels of PAHs detected in areas near the pooled water could pose a health threat to young children who play in these areas. Since data are not available on concentrations of contaminants in the pooled water or related sediments, ATSDR cannot comment on the possible health threats, if any, posed by ingestion or direct contact with them.

RECOMMENDATIONS

1. Restrict access to area of elevated concentrations of PAHs and the pooled water.

2. Initiate steps to limit migration of contaminants to recreational areas.

3. Continue to monitor soil levels if recommendation 2 is deferred.

If additional information becomes available, or you desire further clarification, please do not hesitate to contact the Branch.

Jerome Cater, Ph.D.

Martha Dee Kent

Martha Dee Kent

Attachment